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Center for Advanced Infrastructure & Transportation
Rutgers, The State University of New Jersey

NJDOT Bureau of Research
QUARTERLY PROGRESS REPORT

Project Title:	Ride Quality Follow-Up		
RFP NUMBER: 2002-23	NJDOT RESEARCH PROJECT MANAGER: W. Lad Szalaj		
TASK ORDER NUMBER: 126 / 4-26526	PRINCIPAL INVESTIGATOR: Dr. Nenad Gucunski		
Project Starting Date: 1/01/2003 Original Project Ending Date: 12/31/2004 Modified Completion Date:	Period Covered: 3 rd Quarter 2004		

Task	% of Total	% of Task this quarter	% of Task to date	% of Total Complete
Literature Search and Planning	10	0	100	10
1. Design and Development	70	10	100	70
2. Implementation and Training	10	0	0	0
Final Report	10	30	30	3
TOTAL	100%			83

Project Objectives:

- Selection of a Standard Pavement Profiler (SPP), which will be used as NJDOT's official and standard device to establish the "true" pavement profile for calibration purposes,
- Replacing the currently used Percent Defective Length (%DL) statistic with a more representative ride statistic in calculating bonuses and penalties for contractors, and in representing the user opinion.
- Tabulating equipment characteristics of selected profile measuring devices,
- Developing procedures for calibrating NJDOT's ARAN device and selected profiling devices for use by contractors for quality control,
- Developing procedures for correlating the NJDOT SPP, the NJDOT ARAN and other profilers for QA/QC purposes,
- Development or evaluation of a standard software which will be used to process file data for calculation of accepted ride statistic for use on new and rehabilitated pavement projects, and
- Comparison, verification and testing the software with output from the profile equipment manufacturer.

Project Abstract:

This project is a follow-up of a study conducted by NJDOT Bureau of Research to evaluate the applicability of using automated highway profilers to replace the Rolling Straightedges (RSE) currently used by NJDOT to implement the department's smoothness specifications. The study recommended that NJDOT select an automated profiler to replace the RSE as its official and standard smoothness measuring equipment, and correlation models developed to calibrate other profilers with the standard profiler. It was recommended to select an indicator that better represents ride statistic as compared to using %DL or IRI.

The present project is aimed for carrying out further research to develop new acceptance specifications for improving QA/QC practice of evaluating pavement smoothness. This will involve replacing the presently used RSE device with a standard automated highway profiler and the use of a new ride statistic, which gives better representation of the actual pavement smoothness. The new statistic can then be used for calculating contractor bonuses and penalties as opposed to the current practice of using %DL.



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The approach undertaken in the previous RSE study is being implemented in the present project. The project will be completed in four phases:

- Phase I (Literature Search and Planning) involves a comprehensive literature review, and presentation of findings to RPSIP for discussions and comments. Changes to the proposed work plan based on comments received will be made if required.
- Phase II (Design and Development) involves field data collection for selection of the standard pavement profiler (SPP), analysis of data for calibration and correlation of selected profilers and ARAN using SPP, development of a more representative ride statistic and software development or evaluation of existing software packages.
- Phase III (Implementation and Training) involves presentation of the findings of the research study, its implementation and for training in the use/operation of the correlation and calibration procedure and software developed as part of this study.
- In Phase IV (Reporting) the Final Report and Technical Brief will be submitted for review and comments by the RPSIP. If appropriate, a Research Needs Statement will be produced as a deliverable. This would identify the need for, and the scope of, further study and evaluation of the selected NJDOT Standard Pavement Profiler.

1. Progress this quarter by task:

- Field data collection using ARAN, Dynatest, ICC high speed profilers, Australian Walking profiler and Rod & Level is complete for all 3 sites (9 sections)-Rt.55, I-195 and US 18.
- The analysis is in progress. Some correlations have been developed. In general the profiler results correlate better to the walking profiler data than rod and level. Significant differences observed between profiling devices. Speed and filters affect the computed IRI.
- Pavement smoothness criteria and pavement roughness “diagnostic” tools completed. Two selected criteria, absolute and relative measures of smoothness, describe the roughness of the pavement profile and severity of a vehicle response, respectively. Both are based on the intensity of corresponding spectral functions. The “diagnostic” tool involves use of discrete and continuous wavelet transforms in presentation of the pavement profile and the vehicle response. The criteria and diagnostic tools implicitly consider, or allow detection of, the following factors:
 - Detection of repeated waves of wavelength affecting the ride quality,
 - Effects of the type and speed of the vehicle on the user opinion,
 - Effects of roughness on the magnitude of dynamic forces induced on the pavement and cause damage, etc.

2. Proposed activities for next quarter by task:

- Implementation of the developed software in the analysis of data collected during the profiler comparative study.
- Continued software review and evaluation.
- Reporting.

3. List of deliverables provided in this quarter by task (product date):

4. Progress on Implementation and Training Activities:

N/A

5. Problems/Proposed Solutions:

N/A



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Total Project Budget	\$544,648
Modified Contract Amount:	
Total Project Expenditure to date	\$199,919
% of Total Project Budget Expended	36%

* These are approximate expended amounts for the project; these estimates are for reference only and should not be used for official accounting purposes. For a more accurate project accounting please review the quarterly invoice for this project.